

## **Abstract:**

The purpose of this work was to examine growth trends of Scots pine (*Pinus sylvestris* L.) in Poland and to determine the link between height growth differentiation and current height growth increment of Scots pine and site conditions.

The study material comprises of data on height growth and 5- and 10-year height growth increment of 312 Scots pine which were collected on sample plots representative of the territory of Poland.

On the basis of conducted analyses it was concluded that the course of height growth of Scots pine in Poland is spatially differentiated. It indicates different trajectories of growth curves in individual growth zones observed in both data obtained from stem analyses and the site index model developed on its basis. In the case of zones located in northern Poland the height increment is more durable, whereas changes in growth trajectories consisting in an increase of height increment dynamics at a younger age and its decrease in older stands are observed in southern direction.

The results of studies also indicate long-term changes in height growth dynamics of Scots pine in Poland. The later the stands were established, the bigger the values of height growth curve were obtained in a given age.

On the basis of generalized additive models (GAM) used, a negative correlation of the site index (SI) with the age of stands was established. Age explains 35.9% of SI variability. The application of explanatory variables related to site, selected on the basis of further analyses, increased the share of explained variance to 63.8%. Also, the height growth increment of Scots pine is correlated with the age of trees. Age explains 78.2% of increment variance from 5-year period and 80.8% of increment from 10-year period. Other factors, the application of which increased the share of explained variance to 82.8% for ZH5 and 86.7% for ZH10, are among other things average annual air temperature and sum of annual precipitation. The changes in increment were also observed eastwards and southwards.

The spatial differentiation of the course of height growth means that in order to determine stand growth properly it is necessary to use regional site index models which take into account height growth trajectories characteristic for local specificity of site conditions.

**Keywords:** Scots pine, height growth model, site index, growth trends